



### About Customer

The McArthur Lab is based at McMaster University, which is consistently recognized in global university rankings as one of Canada's most research-intensive, student-centered universities dedicated to advancing human and societal health and well-being.

[www.mcarthurbioinformatics.ca](http://www.mcarthurbioinformatics.ca)

### Geo

North America

### Industry

Life Sciences

### Solution Area

Accelerate Core Applications  
Activate Real-time Analytics  
Power Artificial Intelligence

### Pure Storage®

#### Products in Use

FlashBlade®  
FlashArray//X™

# McArthur Lab Fights Global Threats to Human Health

Andrew McArthur, Ph.D., genomics professor and researcher at Canada's McMaster University, knows that antimicrobial resistance is a growing and global menace to human health. But he remains optimistic that somewhere in the millions of data points his lab processes daily, there are new drugs waiting to be discovered.

To power new gene sequencing systems to accelerate drug discovery, McArthur Lab invested in Pure Storage for high performance computing workloads. Dr. McArthur also gained a pandemic-ready infrastructure that fast-tracked COVID-19 surveillance and mitigation breakthroughs. Today, he continues to monitor global health threats, while playing a leading role in the genomics revolution.

"There's no point in playing with traditional storage because it's just not fast enough. With Pure Storage FlashBlade, we can stay ahead of the curve as we fight global threats to human health."

**DR. ANDREW G. MCARTHUR,**  
PH.D., MCMASTER  
UNIVERSITY

## Impact on McArthur Lab



Analyzes select genomic datasets over 300x faster than previous storage



Powers collective global effort to identify and monitor health threats



Scales easily to support additional research and clinical partnerships

## Challenges



Storage was costly and couldn't keep up with gene sequencing technology



Data from massive genomic datasets were doubling every 3 months



Fast-spreading coronavirus threatened human health worldwide

## Results



Processes large research datasets twice as fast at one-third of the cost



Handles data more efficiently as DNA sequencing technology evolves



Helped isolate live virus, contributing to drug testing and development

## A Critical Need for Speed

Dr. McArthur is at the heart of a 24/7 collaboration with the global biomedical community. His team at McMaster's McArthur Lab designed, developed, and oversee the world's largest database of curated data, models, and algorithms associated with superbugs. Every five minutes, someone somewhere in the world uses these algorithms to analyze a superbug.

The database, which tracks the genes and mutations that cause drug-resistant infections, processes up to 1,000 superbugs every day. Sequencing a single pathogen from one patient can take up to three hours, and researchers may have hundreds of thousands of pathogens to process—so speed is critical.

"It really boils down to one simple question: how quickly is our infrastructure going to get us to the information?" says Dr. McArthur. "Every marginal gain we can get accelerates lab or public health work."

## Boosting Biomedical Innovation

Investigators at McMaster invested in next-generation gene sequencing systems PacBio and Illumina, which provide researchers with highly accurate information that was previously unattainable. But not before investing in the scale-out, unified fast file and object storage platform from Pure Storage. Pairing these cutting edge systems with Pure Storage FlashBlade made breakthroughs in genomic research possible.

"We needed a modern-day infrastructure to underpin our efforts to combat the superbug crisis, which is increasing in both magnitude and severity," says Dr. McArthur. "FlashBlade provides large, rapid, and nimble data storage capacity that can scale as gene sequencing technology advances. It's twice as fast at one-third of the cost."

To scale, McMaster can simply add more blades without compromising on performance. FlashBlade's multi-dimensional performance and high throughput allows Dr. McArthur and his team to keep up with DNA sequencing data, generating insights that lead to faster identification of global threats.

"FlashBlade is ideal for the most critical genomic workloads," says Graig Kelly, technology manager, infrastructure at McMaster University. "The time to results has dropped dramatically. A slide scan analysis that took between seven and 14 days now completes in as little as one hour."

Because the lab serves both research projects and the medical community, the team often taps FlashBlade to sequence the genomes of patients with acute conditions, such as cardiovascular disease. This can generate terabytes of data. There is little time to spare, especially when the diagnosis is still unknown.

"The goal is to reduce time-to-diagnosis for conditions such as sepsis from two days to less than four hours, improving a patient's chances for survival significantly," says Dr. McArthur.



“FlashBlade provides large, rapid, and nimble data storage capacity that can scale as gene sequencing technology advances. It’s twice as fast at one-third of the cost,”

**DR. ANDREW G. MCARTHUR,**  
PH.D., MCMASTER  
UNIVERSITY

## Keeping Up with Pandemic Demands

An already dire situation reached a new level with the onset of the COVID-19 pandemic. Dr. McArthur and his team were able to quickly leverage FlashBlade to run a tool they developed for the international community that helps determine how the virus is spreading and evolving.

Researchers gained insight into the virus through sequencing by isolating it from biological samples, with near real-time processing speeds. In fact, Dr. McArthur and his team were part of the group that isolated the live virus, which helped teams better understand the infection and test therapeutics.

Before long, McArthur Lab was handling testing swabs from thousands of patients across Canada. Researchers extracted the raw, genomic data and fed it into an international database that enabled the scientific community to study and learn how the virus mutated and spread. These early breakthroughs set researchers on the path to developing mRNA vaccines—the first-ever to be based on genomics sequencing.

## Drug Discovery to Save Humanity

Antimicrobial resistance has now reached an all-time critical level due to the increased use of antibiotics to treat patients with secondary infections resulting from COVID-19. Prior to the pandemic, scientific research estimated that superbugs would kill more people than cancer by 2050, according to Dr. McArthur.

Now, it could be as early as 2040. But thanks to rapid advancements during the pandemic, sequencing technology has reached a stage not expected for another 10 to 20 years, giving Dr. McArthur hope.

“We will eventually win this battle, but it’s going to get really tough before it gets better,” says Dr. McArthur, who also plans to use Pure FlashArrays to support additional research projects.

In the meantime, FlashBlade will continue to underpin important drug discovery projects that will help to identify new antibiotics or learn how to make old antibiotics viable again. These include high-end artificial intelligence and machine learning projects connected to an entire floor of robots that do high-throughput screening, generating billions of data points in a couple of days.

“There’s no point in playing with traditional storage, because it’s just not fast enough,” says Dr. McArthur. “With Pure Storage FlashBlade, we can stay ahead of the curve as we fight global threats to human health.”

[purestorage.com](https://purestorage.com)

800.379.PURE

